Motorola
SM56 Modem

Quick Start User's Guide

Contents

1 Overview
2 Introduction
3 Personal Computer Requirements
4 Preparing the Computer for SM56 Installation
5 Installing Hardware
6 Installing SM56 Software
6-1 Installing SM56 Software on Windows 95/98
6-2 Installing SM56 Software on Windows NT4.0
7 Verifying Correct SM56 Installation
8 Changing the Operating System
9 Using the SM56 Modem
10 Un-installing and Upgrading the SM56 Modem
11 Troubleshooting
12 Reporting Problems and Contacting the Modem Supplier
13 Understanding SM56 Windows Logo Certification
14 An Overview of the V.90 Standard Protocol

Appendix A SM56 Features
Appendix B Software License Agreement
Appendix c Supported AT Commands

1 Overview

This document helps the OEM, system integrator, VAR, and end user with host system selection and proper modem hardware and software installation. It lists qualified host personal computer systems, and explains proper modem use. This document helps you select CPUs, and it explains the tradeoffs associated with different processors. It explains the use of the SM56 Data/Fax/Voice modem with various sound card configurations. It also aids you in troubleshooting and testing the SM56 equipped system.

2 Introduction

Motorola's SM56 Modem is a feature-rich modem at an attractive price. It provides high-speed communications between your personal computer and a remote location, such as an Internet Service Provider (ISP), so you can:

- Receive data at up to 56 Kbps in V.90 or K56flex modes
- Get automatic fallback to V.34 (33.6 Kbps) rates in bad line conditions and on non-V.90/K56flex headends
- Use your computer as a **telephone answering** machine (TAM)
- Send and receive faxes on your personal computer at rates up to 14.4 Kbps
- Use your computer as a **video phone** to place and receive video phone calls (Data/Fax/TAM/Speakerphone modem with video equipment)
- Use your computer to conduct hands-off speakerphone **voice calls** (Data/Fax/TAM/Speakerphone modem)

Important
The SM56 ISA modem runs on Windows 95, Windows 98, and it can be used by applications that run in an MS-DOS box (under Windows 95/98). Windows 95 and Windows 98 use the same SM56 software builds.

The SM56 PCI modem also runs on Windows 95 and Windows 98. It does not directly support Windows 95/98 DOS box applications. Refer to the Troubleshooting section for information on a third party COM port virtualizing/trapping application that allows the SM56 PCI modem to be used with DOS box applications.

Personal-computer OEMs that incorporate the SM56 can benefit from sizable cost reductions, hardware reduction, and lower power consumption. End users benefit from quick, easy and affordable software upgrades, which help them keep current with the latest communications technology.

Please check with your direct modem supplier for the latest software updates and other product information.

3 Personal Computer Requirements

Motorola performs rigorous, exhaustive testing on its modems. It developed a list of recommended personal computer features that perform well with the SM56. The information includes qualified CPUs, Level 2 cache requirements, operating systems, RAM requirements, and third-party sound card compatibility. However, in today's dynamic technology markets, it is not possible to test *all* components and combinations on *all* systems.

This section outlines minimum system requirements for SM56 operation. On these systems, CPU loading was found to be acceptable and the modem demonstrated good performance over the entire network model.

***Important*:** SM56 operation is *not limited* to the personal computer systems listed here.

Recommended CPUs

The SM56 modem has been qualified (tested for processor loading and TSB network model coverage) on the following processors:

- Intel Pentium, 150MHz with MMX, 256K Level 2 (L2) cache
- Intel Pentium, 200MHz, 256K L2 cache
- Intel Pentium II
- Intel Pentium Pro
- Intel Celeron (Pentium II, 266MHz, no L2 cache)

The SM56 functions satisfactorily on the following systems. However, it has not been fully qualified (it was not tested for processor loading or TSB performance):

- AMD K6, 233 MHz, 256K L2 cache
- AMD K6-2, 256K L2 cache
- Cyrix 6x86MX, 266MHz, 256K L2 cache

The SM56 does not function on the following CPUs, whose floating-point performance is insufficient:

- Cyrix MediaGX
- Cyrix MediaGXM
- Cyrix 6x86

Level 2 Cache Benefits

Level 2 (L2) cache is an instruction memory (SRAM) bank that resides outside the CPU core. It holds many instructions close to the CPU, to reduce the need for the processor to use slow access cycles fetching instructions from main memory (DRAM). Eliminating most CPU accesses to main memory considerably improves overall system performance.

The SM56 Software Modem works best when a minimum of 256K L2 Cache is installed on the computer system motherboard to minimize processor loading. Intel's Celeron (266MHz PII) systems do not have L2 cache. Although the SM56 operates on those systems, host processor loading increases in the absence of L2 cache.

Compatible Operating Systems

The SM56 modem will run on the following operating systems:

- Windows 95 (OEM Service Release 2.0 or later)
- Windows 98
- DOS Box under Windows 95/98. Note that the SM56 PCI modem does not include direct DOS box support. Refer to the Troubleshooting section for information on working around this limitation.

System RAM Requirements

The SM56 Modem operates on systems that have the minimum RAM required by the installed operating system. As with L2 cache, the more main memory, the better. The recommended RAM is twice the required minimum. This reduces slow hard-disk swapping and improves overall system

performance... especially when executing numerous concurrent processes. The minimum RAM requirements are:

Windows 95/98	16 MB

4 Preparing the Computer for SM56 Installation

To ensure problem-free installation of the SM56 modem, ensure that an IRQ is available, as follows.

1. In Win95/98, open the Control Panel.

2. Double click the **System** icon.

3. Select the **Device Manager** tab.

4. Highlight the **Computer** icon.

5. Select the **Properties** radio button.

6. Ensure that the **Interrupt Request** (IRQ) radio button is selected.

This displays the IRQ lines that are in use on the computer. Available lines are *not* shown in the list. To install the SM56 ISA modem hardware, interrupt line 3, 4, 5, 6, 7, or 9 must be available. The PCI SM56 software modem can use an IRQ in the range 3 through 15.

If there is no IRQ line available for the SM56 disable one of the COM ports in the BIOS.

Note: If you are using a Windows 95/98 DOS box application, the modem requires two IRQs. Refer to the Troubleshooting section in this document, or to the on-line *User's Guide* for more information on DOS application support. You can access the *User's Guide* through the modem Control Panel.

Important: The SM56 PCI modem does not directly support DOS box applications. Please refer to the Troubleshooting section for information on how to get around this limitation.

To ensure that COM Port 2, 3, or 4 is available, you can use the following steps:

1. Open the Control Panel.

2. Double click the **System** icon.

3. Choose the **Device Manager** tab.

4. Highlight the **Ports (COM and LPT)** branch.

5. Expand the branch to see which ports are installed on the computer.

To install the SM56 ISA modem so that it is accessible through older application software and DOS programs, COM port 2, 3, or 4 should be available. If none of these ports are available, you must disable one of the COM ports in the BIOS.

5 Installing Modem Hardware

Hardware Installation:

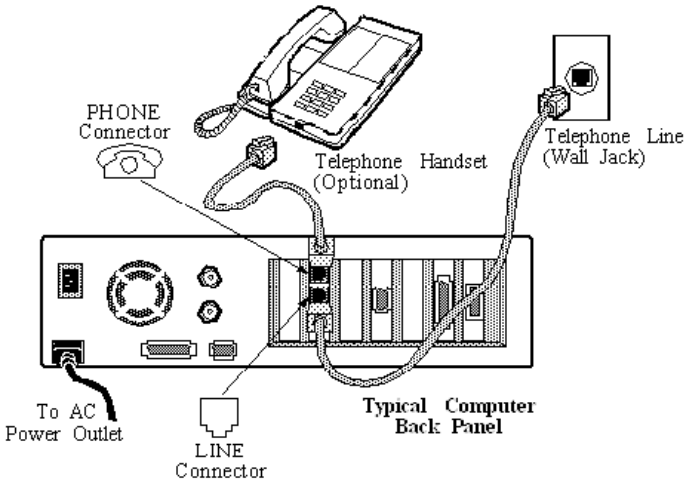
Install the modem card as follows.

1. Power down the personal computer.

2. Locate a vacant bus connector (ISA or PCI, depending on your hardware) and insert the modem card.

3. If using the SM56 Data/Fax/TAM/Speakerphone modem, connect the sound subsystem interface cable(s) to the modem card (via the internal TAPI connector or using the audio jacks -- refer to the information above on sound card compatibility.)

4. Connect the modem **Line** input to an analog phone jack using an RJ-11 phone cable. Optionally, connect a telephone handset to the **Phone** input on the line interface card. The external telephone cable connections are as follows.



5. Replace the personal computer cover and power the personal computer on.

6 Installing SM56 Software

6-1 Installing SM56 Software on Windows 95/98

IPCI Slots

The SM56 for PCI is PCI Plug and Play compliant. It requires one IRQ (IRQ 3, 4,...15) and one memory mapped base address.

Windows 95/98 assigns the modem a COM port number. The SM56 installation software attempts to negotiate a COM port number in the range of 1-4 in order to support older software and DOS games. Note that the SM56 PCI modem does not include direct DOS box support. Please refer to the Troubleshooting section for information on how to get around this limitation.

Installing on Windows 95/98

(**Note**: The Install Wizard may vary slightly with different versions of Windows 95 and Windows 98.)

On starting Windows 95/98 for the first time after installing the SM56 (ISA or PCI) line interface card, the Windows 95/98 Configuration Manager detects the new hardware, assigns resources to it, and then displays a window requesting the modem software drivers. This indicates that the Configuration Manager is looking for the information (INF) file, which contains information about the modem, including device type (Modem), device driver information (the name of the driver that will control the modem) and the AT command/response sets that it supports.

In response to the request window, insert the distribution CD-ROM that contains the SM56 installation software. Select **Driver from Disk Provided by Hardware Manufacturer**. Windows should find the information on the disk and identify the device as the SM56 Modem Line Interface Card. It copies the files from the install disk to the computer.

Note: The SM56 install program may display a message box that reports ***Cannot locate file _inst32.ex_***... If this occurs, browse and re-point the path to the SM56 installation CD ROM again. Then click **OK**.

On boards that have voice capabilities (SM56 Data/Fax/Voice models), another device is found after the modem has been installed. Windows notifies you that it has found a Serial Wave Device for the modem and prompts for a Wave Device driver. Re-point Install Shield to the SM56 distribution disk, and click **OK**.

When these two devices are installed, the SM56 Modem Setup program runs.

SM56 Modem Setup for PCI

The modem setup program for PCI does not prompt for user input during installation. It defaults to **USA** country code and **Domestic English** as the language for the Help files. If you wish to change either of these settings you may do so via the SM56 PCI Control Panel application (see **Verifying Correct SM56 Installation** section) after setup is complete. Also, for SM56 Data/Fax/TAM/Speakerphone modems the microphone and speaker gain selections are done via

the Control Panel application (under the **Advanced** tab). The SM56 PCI Data/Fax/TAM only modem does not have a Microphone/Speaker Gain selections.

Determining Microphone Gain Setting
If you connect the modem to the sound card through the internal TAPI connector, use the following procedure to determine the appropriate microphone gain.

Determine whether the sound card has applied any gain to the microphone signal that is presented at its TAPI
connector.

Note: The SM56 PCI modem (Data/Fax/TAM/Speakerphone only) Control Panel application provides slider bars so users can fine tune speaker and microphone gains more easily.

6-2 Installing SM56 Software on Windows NT 4.0

Important **-- The SM56 software for Windows NT is Data/Fax only, there is no speakerphone or TAM supported.**

Windows NT 4.0 does not fully support plug and play (PnP). Therefore, after installing the modem board in the computer and booting, the operating system will not automatically recognize that new hardware is present. You must manually install the modem as follows:

Step 1 -- Install a COM port for the modem

You must install a COM port for the SM56 modem as follows:

1. Open the Windows NT Control Panel.
2. Double click the **Ports** icon. The **Ports** window opens.
3. Select **Add.**
4. Select a COM port number (in the range 1-4 preferably) that is not already installed, and allocate to it the standard resources as follows:

COM Port	IO Address	IRQ
1	3F8	4
2	2F8	3
3	3E8	4
4	2E8	3

5. When your selections are complete click **OK**.
6. You will be prompted to restart the computer, do *not* do so yet. Select ***Don't Restart Now***.
7. Close the **Ports** window.

Step 2 -- Install the SM56 modem software

1. Open the Windows NT Control Panel.
2. Double click the **Modems** icon....the **Install New Modem** dialog appears.
3. Click the "Don't detect my modem; I will select it from a list" check box. Then click ***Next***.
4. Click the ***Have Disk*** button.
5. *Browse* to the Windows NT SM56 modem install software. Click ***misgmodm.inf*** to highlight it. Then click ***Open***, then click ***OK***.
6. Select the Motorola SM56 Modem (note that the product name listed will vary depending on which modem you have -- Data/Fax/, Data/Fax/TAM, etc.) from the list. Click ***Next***.
7. Click the port number selected in Step 1 above to highlight it as the COM port for the modem. Then click ***Next***. The wizard will now copy all the necessary files and install the SM56 modem on your PC.
8. When complete, restart the PC to activate and start the COM port and SM56 modem devices. You are now ready to use the modem.

7 Verifying Correct SM56 Installation

Verify that the SM56 software and hardware installation was completed correctly as follows.

Verifying SM56 Software Installation

1. Verify correct COM port selection.

You can check COM port installation through the **Modems** icon in the Control Panel or through the **SM56** Control Panel application (see below). Normally, the SM56 will install on COM2, COM3, or COM4. Sometimes, however, depending on your computer system setup or Windows setup, the SM56 may install on COM5 (or higher).

Although the modem functions correctly on COM5, many Internet Service Provider (ISP) software applications (such as AOL) do not work if the modem is on a COM port number higher than COM4. If the SM56 installs on COM5 (or higher), refer to the Troubleshooting section for assistance.

2. Run simple diagnostic from the SM56 Control Panel.

The SM56 software modem provides an informative Control Panel that reports:

- Modem status: in use/not in use; dialing; negotiating a connection; actual connect rate (updated in real time during a connection)
- A button to access the on-line *User's Guide*

The SM56 Control Panel program also provides access to two Windows components:

- COM port and IRQ information
- A diagnostic utility that sends the modem ATI commands and displays the results: software build, modem type (DF or DFV), and more.

To access the diagnostics option from the Control Panel, click **Properties**; select the **Diagnostics** tab; select the **SM56 Modem** from the list; and then click **More Info**. If the driver is properly installed, a dialog box appears, with responses to the ATI commands as shown in the example below. Refer to the AT Commands section in the on-line *User's Guide* for an explanation of ATI commands.

Verifying SM56 Hardware Operation

To verify correct SM56 modem card hardware operation (up to the isolation transformer), you can use the following loop back test procedure.

1. ***Important:*** Remove the telephone line connector from the modem card.

2. Select **Start**.

3. Select **Programs**-->**Accessories-->HyperTerminal**.

4. Double click the **Hypertrm.exe** icon.

5. Optionally, select a connection name and icon.

6. In the **Connect Using** window, select **Motorola SM56** modem.

7. Enter a number in the **Phone Number** box.

8. Select **Dial**.

9. Select **Cancel**.

10. Enter **AT** <cr>.
    The response **OK** should appear.

11. Enter **ATS46 = 23** <cr>.

12. Enter **AT&T1** <cr> . Wait a few seconds.

13. Type some letters at the keyboard. If the hardware is functioning correctly, the letters you type appear on the HyperTerminal display.

8 Changing the Operating System

Windows 98 Upgrade Error Message

If the SM56 modem is installed on a Windows 95 PC, and then the system is upgraded to Windows 98, the following error message appears when Windows 98 starts:

Duplicated device: vcd

To remove the error, edit the SYSTEM.INI file and locate the line that reads:

Device = *vcd

Delete this line. Save the modified SYSTEM.INI file and restart Windows 98. You will no longer get the error message.

9 Using the SM56 Modem

32-Bit Windows 95/98 Applications

Because 32-bit Windows 95/98 applications use TAPI for communicating with modems, using the SM56 is as easy as selecting the SM56 modem by name from the list of available modems.

16-Bit Windows 95/98 Applications

Because 16-bit applications cannot use the TAPI interface, there is a bit more setup needed.

1. Select **Motorola SM56** modem from the list of supported modems (if the SM56 modem is not shown, select **Hayes Compatible modem**).

2. Configure the application's COM port selection. Use the COM port assigned to the SM56 modem.

3. If the application requires it, enter specific AT commands for the SM56 modem. (For a full list of AT commands, refer to the SM56 on-line *User's Guide*). Some typical AT commands are listed below.

DOS-Based Applications and Games

Important: The SM56 PCI modem does not include direct DOS box support. Please refer to the Troubleshooting sections for information on a way to get around this limitation.

The SM56 ISA modem can be used in DOS *only* through a Windows 95/98 DOS box.

DOS support is achieved by virtualizing the standard I/O and IRQ assigned to a COM port. This means that the SM56 drivers capture and redirect all I/O to/from the standard I/O address for the COM port to which it assigned. In simpler terms, you tell the application the COM port of the SM56, and then use all the standard I/O and IRQ settings. Standard I/O addresses and IRQs for COM Ports 1-4 are as follows:

COM Port	IO Address	IRQ
1	3F8	4

2	2F8	3
3	3E8	4
4	2E8	3

To determine the SM56 COM port number, open the SM56 Control Panel and select the **Diagnostics** tab. The COM port number to which the SM56 modem is assigned is listed here. Configure your application to use this COM port. For example, if the SM56 modem has been assigned COM 3, configure your application to communicate through COM 3.

Enter the AT commands for the SM56 modem as required by the application. Some typical AT commands are as follows.

AT Commands Commonly Needed by Applications
Applications generally prompt for the following commands.

Initialization*	AT&F
Hangup	ATH0
Dialing string	ATDT
Answer string	ATA

*Some games require that the modem refrain from performing error correction and data compression. In these cases, use the initialization string **AT&F\N0**.

For a full list of AT commands, refer to the on-line *User's Guide*.

10 Un-installing and Upgrading the SM56 Modem

SM56 Un-Install Procedure

1. Open the Control Panel.

2. Select **Add\Remove Programs**.

3. In the dialog box, select **Motorola SM56 Modem Uninstall.**

4. Select **Add/Remove**.

5. When asked to close the Control Panel window do so to allow the SM56 Control Panel applet to be removed.

6. Shut down the computer.

7. Remove the SM56 hardware from the computer. (**Note**: If you do not remove the SM56 line interface card, the SM56 will be automatically re-installed when Windows 95/98 restarts.)

The SM56 modem software remains on the PC hard disk for later installs without needing a complete software install again. Simply install the modem card back in the PC and the software will automatically self-install.

SM56 Software Upgrade Procedure (Windows 95/98)

Upgrade the SM56 modem to a newer version as follows.

1. Obtain the latest software version from your **direct** modem supplier.

2. Run **setup.exe** and follow the Upgrade Wizard prompts. The upgrade utility retains a backup of your previous modem version in a folder called ***Program Files\Motbak95.***

Recovering From an Unsuccessful Upgrade (Windows 95/98)

If , after an SM56 upgrade, you have problems with the new driver, you can restore your previous SM56 software installation as follows. Perform *all* of the following steps.

1. Open the Control Panel. Select **Add/Remove** programs.

2. If **SM56 Modem** is in the list of installed programs, click on **SM56 Modem**, then Click **Add/Remove** to run the un-install program.

3. Open the **windows\inf\other** folder. Delete all Motorola INF files that are listed there.

4. Edit the Registry and remove the following key if present:

HKLM-->System-->CurrentControlSet-->Services-->SM34DFV

5. Open the Control Panel and determine if the SM56 Modem Control Panel is there. If so, close the Control Panel; open the **windows\system** folder; and delete the **mca.cpl** file.

6. Open the **windows\system.ini** file. Search for **device = motvcd.vxd**. If it is present, change it to **device = *vcd**.

7. Restart the computer.

8. Upon restart, the **New Hardware Found** window appears. Browse to: ***Program Files\Motbak95.***

9. Perform the SM56 software installation procedure (refer to Section 6 or 7). This will reinstall your previous modem software.

11 Troubleshooting

If there is a problem making or receiving a call or transmitting data, and your communications application does not explain the problem, check the following list of symptoms and tips.

• The modem installs at COM 5 (or higher)

Some ISP applications, such as America on-line, do not communicate with a COM port higher than COM4. If the SM56 installs on COM5 or higher, force the modem to a lower COM port as follows.

1. Open the SM56 Control Panel application.

2. Select the **Advanced** tab.

3. Click on the radio button for the desired COM port. Note that unavailable COM ports are grayed out and not selectable.

Note: For SM56 ISA modems Build 58 and later include this feature on the Control Panel applet. If using earlier builds, edit the **PortName** data in the Windows Registry **HKLM-->Enum-->ISAPNP-->*nnnn***, where nnnn corresponds to the modem's plug and play ID. Change **PortName** data to the desired COM port. The changes take effect as soon as the Registry editor (REGEDIT) is closed. There is no need to restart the PC.

• Windows 95/98 DOS box applications do not work with the modem

1. The SM56 PCI modem does not directly support Windows 95/98 DOS box applications. If you are using the SM56 PCI modem you must use a third party application that traps and virtualizes the COM ports. One such application is provided by Pacific Commware, Inc. (Ashland, Oregon). They can be found on the Web at ***www.pacificcommware.com***. The application is called **TurboCom/95 Pro**, and works on Windows 95 and Windows 98 platforms. Note that Motorola have not completely tested and qualified this product for SM56 DOS box support, but have verified basic functionality.

2. If using the SM56 ISA modem, open the Control Panel.

3. Double click the **System** icon.

4. Expand the **Modem** branch.

5. Double click the **Motorola SM56** modem.

6. Select the **Modem** tab. Make a note of the COM port number.

7. Select the **Resources** tab. Make a note of the IRQ number listed.

8. For DOS support to operate correctly, the SM56 modem cannot occupy the standard IRQ for the COM port number.

9. Uncheck the **Use Automatic Resources** check box.

   Double click on the **Interrupt Request** label and change the IRQ to a different level that is not in conflict with another device. (If there is no free IRQ: free one, or change other device IRQ levels to free a non-standard IRQ).

- ## There is no dial tone

1. Ensure that the telephone cable is securely connected at both ends.

2. Unplug the telephone line cable from the computer, and connect it directly to a telephone from the wall outlet. Check for a dial tone. If there is none, the problem is in the telephone line or system. Call the service provider.

- ## The modem cannot complete a connection to another modem

1. Ensure that your modem is dialing the correct number. Ensure that you've specified the correct area code, if one is required.

2. Determine whether the remote modem is correctly configured to communicate with yours.

- ## The modem does not answer incoming calls

1. Ensure that the automatic answer parameter is set to one of the enabled options, using the ATS0 command (ATS0=1 to answer after one ring, and so on).

2. Ensure that no other devices, such as fax or answering machines, are answering calls before the modem does.

- ## The modem disconnects while transmission is in progress

1. Ensure that the telephone cable is securely connected at both ends.

2. Ensure that call-waiting is disabled. In most areas, the command *70 or #70 disables call-waiting. Check with your telephone company for the correct key sequence. (With call-waiting, the incoming call's click sound may be disrupting your call.)

- ## Data is not transmitted or received for unusually long periods of time

Re-dial the call. (The telephone line connection may be poor.)

• The computer runs slower than usual

1. Close any open applications that you are not using.

2. For the SM56 for ISA only: try adjusting the modem's CPU Usage option from **High** to **Medium**; or **Medium** to **Low**. This is in the SM56 Control Panel application. This option is not available for the PCI modem.

• You cannot enter tone selections successfully when calling tone-driven applications

When dialing a remote system that requires you to enter selections using the telephone keys, such as a voice-mail depot or bank-account information provider, you can lengthen the duration of the tones your modem sends, so that the remote system can detect them better. To adjust DTMF tone length, use the AT+VTD*n* command, where *n* specifies the tone duration.

• The modem does not respond to AT commands

1. Ensure that your communications software is configured to use the same COM port as the modem's COM port.

2. Reset modem parameters to default options by entering AT&F; then re-enter custom options.

3. SM56 builds after Build 50 require setting the S46 register to 23 before AT&T1 will perform the Local Analog Loop(LAL) back hardware test.

• The modem responds to commands, but they do not appear on the screen

Ensure that the Echo option is enabled by entering ATE1.

• You've installed a new peripheral device; now the modem does not work

1. In the Windows desktop tray, select **Start**. The start menu appears.

2. Select **Help**. The **Windows Help Topics** window appears.

3. Select the **Contents** tab.

4. Select **If You Have a Hardware Conflict**.

5. A series of troubleshooting actions appears. Follow the appropriate sequence.

- **You hear feedback (noise) from the sound system (Data/Fax/TAM/Speakerphone only)**

1. Position the speakers at least three feet (1 M) away from the microphone.
2. Ensure that the speakers are facing away from the microphone.
3. Turn down the speaker volume.
4. Speak into the microphone at a distance of at least 12 inches (30 cm) from your mouth. Minimize background noise.
5. If there is still feedback, turn off the microphone boost, under the volume control panel.

- **The modem connects; then meaningless characters appear**

1. Open the **Control Panel.** Double click the **Modem** icon.
2. Select the **Motorola SM56** modem
3. Click on **Properties**.
4. Select **Connection**.
5. Click on **Advanced**.
6. Check the **Use Error Control-Required to Connect** box.

- **The modem cannot connect; the Error Control option is selected**

The modem may be connecting at a rate higher than appropriate for the line conditions.

1. Use the AT%B command to limit the SM56 maximum connection rate. (For a list of AT commands, refer to the on-line *User's Guide*.)
2. Lower the rate, using AT commands, until the problem is corrected. You can add AT commands to do this; refer to the next section .

How to Add AT Commands

1. Open the Control Panel.
2. Double-click the **Modem** icon.

3. Select the **Motorola SM56** modem.

4. Click on **Properties**.

5. Select **Connection**.

6. Click on **Advanced**.

7. In the **Extra Settings** box, add commands as needed.

12 Reporting Problems and Contacting the Modem Supplier

If you have a problem with the modem, ensure that the problem and its solution are not shown in the Troubleshooting section. If you cannot resolve it through troubleshooting, send the following information in an email to your **direct modem supplier**, so that they can reproduce and resolve the problem.

Information about your computer:
- Brand and model
- CPU type (Pentium, Pentium II, AMD, etc.) Specify if MMX
- CPU clock rate
- Amount of Level 2 cache memory
- Operating system and version (Windows 95 OSR revision level, Windows 98, etc.)

Information about your modem:
- SM56 modem card version; modifications to your SM56 modem card
- SM56 version number (find this with the **ATI3** command; or with the **More Info** button in the SM56 Control Panel)

Information about your setup:
- The telephone number you are calling from
- The telephone number you are calling to
- If performing a lab test, a detailed description of the equipment used
- The remote modem information

Information about the problem:
- The actions and steps that you performed
- A description of what you saw; be specific
- A description of what you expected to see

13 Understanding SM56 Windows Logo Certification

After rigorous testing at a Microsoft Windows Hardware Quality Lab (WHQL), the ISA bus-based SM56 software modem met the stringent qualifications to receive the **Designed for**

Microsoft Windows logo. The PCI modem will be qualified later. The logo is targeted at commercially marketed desktop applications that run on the latest released versions of Windows 95, Windows 98, and Windows NT Workstation. It is not intended for client/server or Windows NT Server applications. The goals of the logo certification program are to improve Windows hardware and software quality, increase end-user satisfaction, and reduce support costs.

To receive the logo, a product must show proof of compatibility with Windows 95/98 *and* NT. The SM56 Software Modem passed the stringent tests to show that, among other capabilities, it:

- Installs and registers itself properly with the operating system
- Is reliably functional and stable
- Removes itself (minus its core components) using an automated uninstaller
- Supports Universal Naming Conventions (UNC) and Long File Names (LFN)

The modem also passed a host of other performance and feature-set tests of its data, fax, and voice modes.

What does the logo mean for the SM56 ISA modem? It means that Motorola and its OEMs, system integrators, and VARs can now use the Windows logo on their products and packaging, and on advertising, collateral, and marketing materials. This signals end users that the SM56 software modem is tested and fully functional on Windows 95/98 and Windows NT 4.0; that it is designed to provide optimum usability and compatibility; and that it takes advantage of the latest technologies provided by these operating systems. It makes users feel more comfortable about purchasing the product, and it assures them of more complete satisfaction while using it.

The Windows logo also means that the SM56 software modem is included on Microsoft's Windows Hardware Compatibility List (HCL) under "Logo," reinforcing to customers and end-users alike that it meets Microsoft's strict requirements and operates properly with Windows operating systems.

In summary, Windows Logo certification increases recognition and adoption of SM56 Software Modem technology worldwide. It demonstrates Motorola's long-term commitment to providing high performance, quality products.

14 An Overview of the V.90 Standard Protocol

In February 1998, the International Telecommunications Union (ITU) formulated the V.90 industry-standard protocol for 56K modems. Before the adoption of the V.90 standard, 56K modems complied with one of two pre-standard implementations: K56flex or X2 technology. Unfortunately for ISPs and end-users, these technologies were not compatible. ISPs had to worry about which standard to employ. End users had to be sure to purchase modems compatible with their ISP's equipment.

Upgrading Motorola's SM56 K56flex modems to V.90 is a software-only upgrade. There is no change to the line interface hardware. This makes it easy for pre-V.90 users to upgrade their system to V.90 compliance.

Note: sometimes V.90 is referred to as V.PCM. PCM is an acronym for Pulse Code Modulation. With V.90, high-speed downstream (from Internet to personal computer) data transmission is accomplished using PCM techniques. Before the ITU formulated its standard V.90 protocol, the industry typically referred to it as V.PCM. This name is fading from use.

V.90 technology allows users to connect to the Internet at rates up to twice as fast as those of V.34 (33.6Kbps) modems. The maximum receive (downstream) rate is 56Kbps, while the return path (upstream) connects at V.34 rates up to 33.6 Kbps. This is perfect for Internet connections, where most data is transferred downstream.

The SM56 begins connections by attempting a V.90 connection to the headend. If the headend is not V.90, the SM56 automatically switches to K56flex mode. If K56flex mode fails (when, for example, the headend uses X2 technology, or there is a noisy phone line condition), the SM56 drops to V.34 rates. This auto-mode switching mechanism ensures maximum compatibility with all remote headends.

On the Web you can visit **www.v90.com** for a wealth of information on V.90 technology, including:

- A list of ISPs that support V.90
- The latest news on V.90
- White papers on the V.90 standard
- Technology descriptions
- Frequently asked questions (FAQs)

Appendix A: SM56 Specifications

- Full Windows 95/98 compatibility; received Microsoft Designed for Windows Logo
- Compatibility with Windows 95/98 communication applications
- Compatibility with communications applications that run in an MS-DOS® box
- An installation engine with country selection. (Selecting the correct country during installation is important, since this selects between A-Law and μ-Law companding)
- Plug and Play operation
- Support for various data modulation modes:
  - V.90 connection rates if the headend is a true V.90 location. V.90 downstream rates to 56Kbps. Upstream rates to 33.6Kbps (V.34).
  - Fallback to K56flex® mode if theheadend is K56flex, not V.90. K56flex® downstream rates to 56Kbps. Upstream rates to 33.6Kbps(V.34).
  - Connection at V.34 rates (33.6 Kbps) if the headend is not V.90 *or* K56flex®.
  - V.32bis, V.32, V.22bis, V.23, V.22/B212, V.21, Bell 103.
- Error correction - V.42, LAPM, MNP2-4
- Data compression - V.42bis, MNP5
- Fax modes supported - V.17, V.27ter, V.29
- Full voice support on Data/Fax/TAM/Speakerphone modems...where TAM is Telephone Answering Machine.

- Full-duplex speaker phone with acoustic and line echo cancellation (Data/Fax/TAM/Speakerphone modems only)
- Answering machine capability with PCM and IMA ADPCM audio formats
- Caller ID (USA and Canada)
- Distinctive Ring (USA and Canada)
- Control Panel that provides general modem information and diagnostics
- Full pulse and tone dialing and call progress monitoring
- Adaptive rate re-negotiation (up and down) during a connection to compensate for line dynamics
- Auto dial and answer
- On-line user's guide accessible through the Control Panel

Appendix B: Software License Agreement

THE FOLLOWING AGREEMENT IS A LEGAL AGREEMENT BETWEEN YOU (EITHER AN INDIVIDUAL OR ENTITY), AND MOTOROLA, INC. (FOR ITSELF AND ITS LICENSORS). THE RIGHT TO USE THIS PRODUCT IS SOLD ONLY ON THE CONDITION THAT YOU AGREE TO THE FOLLOWING LICENSE. USING THIS PRODUCT CONSTITUTES ACCEPTANCE OF THE TERMS AND CONDITIONS SET FORTH IN THIS AGREEMENT.

The enclosed computer program(s) ("Software") is licensed, not sold, to you by Motorola, Inc. ("Motorola") for use only under the terms of this License, and Motorola reserves any rights not expressly granted to you. You own the disk(s) on which the Software is recorded or fixed, but Motorola and its licensors retain ownership of the Software itself and its accompanying written materials, which are protected by the copyright laws of your country and international treaty provisions.

1. License. This License allows you to use one copy of the Software on a single computer at a time. To "use" the Software means that the Software is either loaded in the temporary memory (e.g., RAM) of a computer or installed on the permanent memory of a computer (e.g., hard disk).

2. Restrictions. The Software contains trade secrets in a human or machine perceivable form and, to protect them, you may not REVERSE ENGINEER, DECOMPILE, DISASSEMBLE OR OTHERWISE REDUCE THE SOFTWARE TO ANY HUMAN OR MACHINE PERCEIVABLE FORM. YOU MAY NOT MODIFY, ADAPT, TRANSLATE, RENT, LEASE, LOAN OR CREATE DERIVATIVE WORKS BASED UPON THE SOFTWARE OR ANY PART THEREOF.

3. Termination. This License is effective until terminated. This License will terminate immediately without notice form Motorola or judicial resolution if you fail to comply with any provision of this License. Upon such termination you must destroy the Software, all accompanying written materials and all copies thereof, and Sections 5, 6, 7 and 8 will survive any termination.

4. Export Law Assurances. You agree that neither the Software nor any direct product thereof is being or will be shipped, transferred or re-exported, directly or indirectly, into any country

prohibited by the United States Export Administration Act and the regulations thereunder or will be used for any purpose prohibited by the Act.

5. Warranty. The Software and written materials are provided "AS IS" and without warranty of any kind. Motorola's entire liability and your sole and exclusive remedy for any breach of the foregoing limited warranty will be, at Motorola's option, replacement of the disk(s) or refund the amount paid for this Software License.

NO OTHER WARRANTY IS PROVIDED BY MOTOROLA, AND MOTOROLA AND ITS LICENSORS EXPRESSLY DISCLAIM ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. MOTOROLA DOES NOT WARRANT THAT THE OPERATION OF THE SOFTWARE WILL BE UNINTERRUPTED OR ERROR-FREE, OR THAT DEFECTS IN THE SOFTWARE WILL BE CORRECTED. NO ORAL OR WRITTEN REPRESENTATIONS MADE BY MOTOROLA OR AN AGENT THEREOF SHALL CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS WARRANTY. BECAUSE SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF IMPLIED WARRANTIES, THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

6. Limitation of Remedies and Damages. Regardless of whether any remedy set forth herein fails of its essential purpose, in no event shall Motorola or any of the licensors, directors, officers, employees or affiliates of the foregoing be liable to you for any consequential, incidental, indirect, special or similar damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information and the like), whether foreseeable or unforeseeable, arising out of the use or inability to use the Software or accompanying written materials, regardless of the basis of the claim and even if Motorola or a Motorola representative has been advised of the possibility of such damage. Motorola's liability to you for direct damages for any cause whatsoever, and regardless of the basis of the form of the action, will be limited to the price paid for the Software that caused the damages. THIS LIMITATION WILL NOT APPLY IN CASE OF PERSONAL INJURY ONLY WHERE AND TO THE EXTENT THAT APPLICABLE LAW REQUIRES SUCH LIABILITY WITHOUT THIS LIMITATION. BECAUSE SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

7. General. This License will be construed under the laws of the State of Massachusetts with venue therein (or in the case of exclusive Federal jurisdiction, with venue in the Federal District of Massachusetts). If any provision or portion thereof of this License shall be held by a court of competent jurisdiction to be void or unenforceable, that provision will be enforced to the maximum extent permissible, and the remaining provisions of this License will remain in full force and effect. If you are a U.S. Government user, then the Software is provided with "RESTRICTED RIGHTS" as set forth subparagraphs (c)(1) and (2) of the Commercial Computer Software-Restricted Rights clause at FAR 52 227-19 or subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013, as applicable.

8. Complete Agreement. This License constitutes the entire agreement between the parties with respect to the use of the Software and related documentation, and supersedes all prior or

contemporaneous understandings or agreements, written or oral, regarding such matter. No amendment to or modification of this License will be binding unless in writing and signed by a duly authorized representative of Motorola.

Appendix A - Supported AT Commands

Table of Supported AT Commands

AT Cmd	Function	Mode	Value	Setting
A	Answer	DF	-	-
D	Dial	DFV	-	-
E	Async Echo	DFV	0	Disable
			1	Enable
H	Go on hook	DFV	0	Go On Hook
			1	Go On Hook, Busyout
I	Request Information	DFV	0	'960'
			1	'000'
			2	K;
			3	Software Version
			5	Disconnect Reason
			6	Country Code
			7	Product Code
L	Speaker Volume	DFV	0,1	Low
			2	Medium
			3	High
M	Speaker Control	DFV	0	Off
			1	On During Training Only
			2	On Always
			3	Security
O	Return to On-Line	DFV	0	No Retrain
			1	Retrain
			2	Rate Renegotiation
P	Pulse Dial	DFV	-	-
Q	Result Code Display	DFV	0	Enable
			1	Disable
T	Tone Dial	DFV	-	-
V	Result Code Format	DFV	0	Numeric Code
			1	Verbose Code
X	Call progress Result Codes	DFV	0	NO CARRIER, CONNECT
			1	NO CARRIER, CONNECT, CONNECT <rate>
			2	NO CARRIER, CONNECT, CONNECT <rate>, NO DIALTONE
			3	NO CARRIER, CONNECT, CONNECT <rate>, BUSY
			4	NO CARRIER, CONNECT, CONNECT <rate>, NO DIALTONE, BUSY
Z	Reset to Default Configuration	DFV	-	-

AT Cmd	Function	Mode	Value	Setting
&C	DCD Control	DFV	0	Always On
			1	On in Data Mode Only
&D	DTR Control	DFV	0	Ignore DTR
			1	On-to-Off, Enter Command Mode
			2	On-to-Off, Disconnect Call
			3	On-to-Off, Reset to Default Configuration
&F	Reset to Default Configuration	DFV	-	-
&F=n	Reset to Specific Country	DFV	N	See table A for values of N
&G	Guard Tone	DFV	0	Off
			1	550 Hz
			2	1800 Hz
&I	Dial TX Level	DFV	0 -15	TX levels 0 through -15 (default -9)
&P	Pulse Cycle	DFV	0	40/60 Make/Break Ratio
			1	33.5/66.5 Make/Break Ratio
			2	38.5/61.5 Make/Break Ratio
&R	CTS Control	DFV	0	Normal
			1	Always On
&S	DSR Control	DFV	0	Always On
			1	On When Modem Recognizes Remote
&T	Test	DF	0	End Test
			1	Initiate LAL
&V	Modem Status	DFV	0,1	Short Form
			2	Long Form
%B	Max Modulation Rate	DFV	0	Maximum Rate (33600 bps)
			1	300 bps
			2	1200 bps
			3	2400 bps
			4	4800 bps
			5	600 bps
			6	9600 bps
			7	7200 bps
			8	12000 bps
			9	14400 bps
			11	16800 bps
			12	19200 bps
			13	21600 bps
			14	24000 bps
			15	26400 bps
			16	28800 bps
			17	31200 bps
			18	33600 bps
			19	32000 bps
			20	34000 bps
			21	36000 bps
			22	38000 bps
			23	40000 bps
			24	42000 bps
			25	44000 bps
			26	46000 bps
			27	48000 bps
			28	50000 bps

AT Cmd	Function	Mode	Value	Setting
			29	52000 bps
			30	54000 bps
			31	56000 bps
			32	58000 bps
			33	60000 bps
%C	Data Compression	DFV	0	Disable
			1	Enable
%D	Disconnect Buffer Delay	DFV	0	Disabled
			1 - 255	Seconds
%L	Min Modulation Rate	DFV	0	Minimum Rate (300 bps)
			1	300 bps
			2	1200 bps
			3	2400 bps
			4	4800 bps
			5	600 bps
			6	9600 bps
			7	7200 bps
			8	12000 bps
			9	14400 bps
			11	16800 bps
			12	19200 bps
			13	21600 bps
			14	24000 bps
			15	26400 bps
			16	28800 bps
			17	31200 bps
			18	33600 bps
			19	32000 bps
			20	34000 bps
			21	36000 bps
			22	38000 bps
			23	40000 bps
			24	42000 bps
			25	44000 bps
			26	46000 bps
			27	48000 bps
			28	50000 bps
			29	52000 bps
			30	54000 bps
			31	56000 bps
			32	58000 bps
			33	60000 bps
\K	Break Handling	DFV	1	Destructive and Expedited
			3	Non-Destructive and Expedited
			5	Non-Destructive and Non-Expedited
\N	EC Mode	DFV	0	Normal
			1	Direct
			4	LAPM Only (ETC)
			6	Reliable
			7	Auto-Reliable

AT Cmd	Function	Mode	Value	Setting
\Q	DTE Flow Control	DFV	0	Disable
			1	XON/XOFF
			3	RTS/CTS
\T	DTE Inactivity Disconnect	DFV	0	Disable
			1 - 255	Minutes
\V	Connect Message Format	DFV	0	Display DTE Rate
			1	Display DTE Rate with EC/DC Info
			2	Display DCE Rate
			3	Display DCE Rate with EC/DC Info
			4	Display DCE Rate with EC/DC and Modulation Info
*BA	Baud Rate When Answer	DFV	0	2400 only
			3	2400 or 3000
			4	2400, 3000, or 3200
			5	2400, 3000, 3200, or 3429
*BO	Baud Rate When Originate	DFV	0	2400 only
			3	2400 or 3000
			4	2400, 3000, or 3200
			5	2400, 3000, 3200, or 3429
			10	2400, low Carrier Frequency (overrides *BA)
			11	2400, high Carrier Frequency (overrides *BA)
			12	3000, low Carrier Frequency (overrides *BA)
			13	3000, high Carrier Frequency (overrides *BA)
			14	3200, low Carrier Frequency (overrides *BA)
			15	3200, high Carrier Frequency (overrides *BA)
			16	3429, low Carrier Frequency (overrides *BA)
			17	3429, high Carrier Frequency (overrides *BA)
*CDL	Clear Delay/Forbid Lists	DFV	-	-
*CT	Status Information	DFV	0	Display EIA Info. See Table B
			1	Display Disconnect Code. See Table C.
			2	Display Ring Count
*DCN	Display Country Number	DFV	-	Number will be the same as in Table A
*DD	Dial Wait	DFV	0	2 Seconds
			1	3 Seconds
			2	4 Seconds
			3	6 Seconds
			4	12 Seconds
			5	15 Seconds
			6	20 Seconds
			7	30 Seconds
			8	40 Seconds
*HO	Homologation Strap	DFV	Multi-Parameter	Parameters described in Appendix E
*LS	Low Speed	DFV	0	Bell 103
			1	CCITT V.21
			2	Bell 103 or V.21
*MM	Modulation Mode	DFV	0	V.34 Auto
			1	V.21
			2	Bell 103
			4	V.22/Bell 212
			5	V.22bis
			6	V.23
			10	V.32
			11	V.32bis
			12	V.34 Only

AT Cmd	Function	Mode	Value	Setting
			13	V.PCM Only
			14	V.PCM Auto
*TD	Dial TX Level	DFV	0 - 15	TX Level 0 through -15 (default -9)
+A8E	V.8 Origination Negotiation	DFV	0	Disable
			1	Enable DCE-controlled V.8 orig neg
			6	Enable DCE-controlled V.8 orig neg, use +A8x indications
	V.8 Answer Negotiation	DFV	0	Disable
			1	Enable DCE-controlled V.8 ans neg
			5	Enable DCE-controlled V.8 ans neg, issue +A8x indications
	V.8 CI Signal Call Function	DFV	00h - FFh	Default is 00h
	V.8bis Control	DFV	0	Disabled
			1	Enabled - DCE controlled
			2	Enabled - DTE controlled
+A8T	V.8bis Tx Signal	DFV	0	None
			1	Initiating MRe
			2	Initiating MRd
			3	Initiating Cre, low power
			4	Initiating Cre, high power
			5	Initiating CRd
			6	Initiating ESi
			7	Responding MRd, low power
			8	Responding MRd, high power
			9	Responding CRd
			10	Responding ESr
	V.8bis Tx Message 1	DFV	x	Hexadecimal octet coded string
	V.8bis Tx Message 2	DFV	x	Hexadecimal octet coded string
	V.8bis Signal Detection	DFV	0	Enable detection of initiating V.8bis signals
			1	Enable detection of responding V.8bis signals
			2	Enable detection of both V.8bis signals
	V.8bis Message Detection	DFV	0	Disable detection of V.8bis messages
			1	Enable detection of V.8bis messages
	V.8bis Message Delay	DFV	0	No delay between tx V.8bis signal and message
			1	1.5 second delay between tx V.8bis signal and message
+DR	Data Compression Reporting	DFV	0	Disabled
			1	Enabled
+DS	Data Compression Direction	DFV	0	No Compression
			1	Tx Only
			2	Rx Only
			3	Both Direction, Accept any direction
	Data Compression Negotiation	DFV	0	Do not disc if V.42bis not negotiated as per Direction
			1	Disconnect if V.42bis not negotiated as per Direction
	Maximum Dictionary Size	DFV	512 - 65535	Default is 2048
	Maximum String Size	DFV	6 - 250	Default is 32
+EB	Break Selection	DFV	0	Ignore
			1	Non-Expedited and Non-Destructive
			2	Expedited and Non-Destructive
			3	Expedited and Destructive
	Timed	DFV	0	Transmission of L-SIGNAL shall not indicate length
			1	Transmission of L-SIGNAL shall indicate length
	Default Length	DFV	0	Do not deliver break to DTE
			1 - 254	Break length in .01 seconds (Default is 100)

AT Cmd	Function	Mode	Value	Setting
+ER	Error Control Reporting	DFV	0	Disabled
			1	Enabled
+ES	Originate Request EC Mode	DFV	0	Direct Mode
			1	Normal Mode
			2	LAPM Only
			3	LAPM or MNP (V42 Detection Phase)
			4	MNP Only
			6	Initiate Synchronous Access Mode when connected
	Originate Fallback EC Mode	DFV	0	EC Optional, fallback to Normal Mode
			1	EC Optional, fallback to Direct Mode
			2	EC Required (LAPM or MNP)
			3	EC Required (LAPM Only)
			4	EC Required (MNP Only)
	Answer Fallback EC Mode	DFV	0	Direct Mode
			1	Normal Mode
			2	EC Optional, fallback to Normal Mode
			3	EC Optional, fallback to Direct Mode
+ES (cont.)			4	EC Required (LAPM or MNP)
			5	EC Required (LAPM Only)
			6	EC Required (MNP Only)
			8	Initiate Synchronous Access Mode when connected
+ESA	Transparent Sub-Mode Idle	DFV	0	DCE transmits 8 bit SYN sequence on idle.
	Framed Sub-Mode Idle	DFV	0	DCE transmits HDLC flags on idle.
	Framed Sub-Mode Underrun or Overrun	DFV	0	DCE transmits abort on underrun in middle of frame.
			1	DCE transmits a flag on underrun in middle of frame, notifies DTE of underrun or overrun.
	Half Duplex Control	N/A	-	Not Used
	CRC Type	DFV	0	CRC generation and checking is disabled
			1	In framed sub-Mode 16 bit CRC is generated by the DCE in Tx direction and checked by the DCE in RX direction.
	NRZI Control	DFV	0	NRZI encoding and decoding is disabled
+ETBM	Disc Buff Dly - Pending TD	DFV	0	Discard buffered data and disconnect
			1	Attempt until all data delivered, ignore timer
			2	Attempt until all data is delivered or timer expires
	Disc Buff Dly - Pending RD	DFV	0	Discard buffered data and disconnect
			1	Attempt until all data delivered, ignore timer
			2	Attempt until all data is delivered or timer expires
	Disc Buff Dly - Timer	DFV	0 - 255	Delivery timer in seconds (default is 0)
+FCLASS	Fax/Modem Mode	DFV	0	Data Mode
			1	Fax Class 1 Mode
			8	Voice Mode
+FLO	Fax Flow Control	DFV	0	None
			1	XON/XOFF
			2	RTS/CTS
+FMI?	Report Manufacturer ID	DFV	-	-
+FMM?	Report Modem ID	DFV	-	-
+FMR?	Report Revision #	DFV	-	-
+FPR	Fax DTE Rate	DFV	0	Autobaud
+FRH	Receive HDLC Mode	F	3	V.21 at 300 bps
			24	V.27ter at 2400 bps
			48	V.27ter at 4800 bps
			72	V.29 at 7200 bps
			73	V.17 at 7200 bps with long train time
			74	V.17 at 7200 bps with short train time

AT Cmd	Function	Mode	Value	Setting
			96	V.29 at 9600 bps
			97	V.17 at 9600 bps with long train time
			98	V.17 at 9600 bps with short train time
			121	V.17 at 12000 bps with long train time
			122	V.17 at 912000 bps with short train time
			145	V.17 at 14400 bps with long train time
			146	V.17 at 14400 bps with short train time
+FRM	Receive Mode	F	X	Same values as +FRH
+FTH	Transmit HDLC Mode	F	X	Same values as +FRH
+FTM	Transmit Mode	F	X	Same values as +FRH
+FTS	Pause Transmission	F	0 - 255	10ms Intervals
+FRS	Wait for Silence	F	0 - 255	10ms Intervals
+GCAP	Request Capabilities List	DFV	-	-
+GCI	Country of Installation	DFV	00	Japan
			04	Germany
			09	Australia
			0A	Austria
			0F	Belgium
+GCI (cont.)			20	Canada
			2E	Czech Republic
			31	Denmark
			3C	Finland
			3D	France
			42	Germany (yes, again)
			50	Hong Kong
			57	Ireland
			58	Israel
			59	Italy
			6C	Malaysia
			7B	Netherlands
			82	Norway
			8B	Portugal
			9C	Singapore
			9F	South Africa
			A0	Spain
			A5	Sweden
			A6	Switzerland
			A9	Thailand
			AE	Turkey
			B4	United Kingdom
			B5	USA
+GMI?	Request Manufacturer ID	DFV	-	-
+GMM?	Request Model ID	DFV	-	-
+GMR?	Request Revision #	DFV	-	-
+IFC	DCE by DTE Flow Control	DFV	0	None
			1	XON/XOFF no pass through
			2	RTS
			3	XON\XOFF pass through
	DTE by DCE FlowControl	DFV	0	None
			1	XON/XOFF
			2	CTS
+ILRR	DTE Local Rate Reporting	DFV	0	Disable
			1	Enable

AT Cmd	Function	Mode	Value	Setting
+ITF	Tx Flow Off Threshold	DFV	0 - 2047	default is 255 octets
	Tx Flow On Threshold	DFV	1 - 2047	default is 255 octets
+MS	Carrier	DFV	V21	V.21
			V22	V.22
			V22B	V.22bis
			V23C	V.23
			V32	V.32
			V32B	V.32bis
			V34	V.34
			VPCM	56K
			B103	Bell 103
	Automode	DFV	0	Disabled
			1	Enabled
	Min Rate (Tx)	DFV	0	Minimum defined by Carrier
			x	x = rate (default is 300)
	Max Rate (Tx)	DFV	0	Maximum defined by Carrier
			x	x = rate (default is 33600)
	Min Rx Rate	DFV	0	Minimum defined by Carrier
			x	x = rate (default is 300)
	Max Rx Rate	DFV	0	Maximum defined by Carrier
+MS			x	x = rate (default is 60000)
+MR	Modulation Reporting Control	DFV	0	Disable
			1	Enable
+VCID	Caller Identification Enable	DFV	0	Disable
			1	Enable
+VDR	Distinctive Ring Enable	DFV	0	Disable
			1	Enable
	Distinctive Ring Report	DFV	0	No RING displayed
			1 - 255	RING displayed after delay (10ms units)
+VEM	Event Reporting Control	V	Bit-Mapped	32 bit event mask. Bit positions described in table D
+VGR	Receive Gain Selection	V	128	
+VGT	Transmit Volume Selection	V	128	
+VIP	Initialize Voice to Default	V	-	-
+VLS	Analog Source Selection	V	0	DCE on-hook
			1	DCE off-hook, DCE connected to Telco
			8	DCE on-hook, DCE connected to Speaker
			9	DCE off-hook, DCE connected to Telco and Speaker
			11	DCE on-hook DCE connected to Microphone
			13	DCE off-hook, DCE connected to Telco, Speaker, and Microphone
+VNH	Automatic Hang-Up Control	DFV	0	Retain Automatic Hang-Up
			1	Disable DCE Initiated Automatic Hang-Ups
			2	Disable all Automatic Hang-Ups
+VPR	Voice DTE-DCE Rate	V	0	Autobaud
+VRA	Ringback Goes Away	V	0 - 255	0.1 second increments (default of 50)
+VRN	Ringback Never Appeared	V	0 - 255	0.1 second increments (default of 10)
+VRX	Enter Voice Receive Mode	V	0	Periodic tones while recording
			1	Periodic tones while recording
+VSD	Silence Detection: Level	V	0	use +VSM value. If 0, use 128
			128	medium
	Silence Detection: Duration	V	0	Disable
			1 - 255	0.1 second increments (default of 50)
+VSM	Voice Comp: Method	V	128	PCM

AT Cmd	Function	Mode	Value	Setting
			129	ADPCM
	Voice Comp: Sample Rate	V	8000	8000Hz
	Voice Comp: Silence Level	V	0	Disable
	Voice Comp: Silence Exp	V	0	Disable
+VTD	Beep Tone Duration	V	0 - 255	0.01 second increments (default of 100)
+VTX	Enter Voice Transmit Mode	V	-	-
+VTS	DTMF and Tone Generation	V	Multi-Parameter	Parameters described in table E
S0	Auto Answer	DFV	0 - 255	Default = 0
S1	Ring Count	DFV	-	-
S2	Escape Character	DFV	0 - 255	Default = 43 (+)
S3	Carriage Return	DFV	0 - 127	Default = 13 (CR)
S4	Line Feed	DFV	0 - 127	Default = 10 (LF)
S5	Backspace	DFV	0 - 127	Default = 8 (BS)
S6	Blind Dial	DFV	0 - 255	Default = 2 (Units = Seconds)
S7	Call Time-out	DFV	1 - 255	Default = 30 (Units = Seconds)
S8	Pause Delay	DFV	0 - 255	Default = 2 (Units = Seconds)
S10	DCD Loss Disconnect	DFV	0 - 255	Default = 14 (Units = 0.1 Seconds)
S11	Tone Length	DFV	60 - 255	Default = 72 (Units = 0.001 Seconds)
S12	Escape Code Guard Time	DFV	0 - 255	Default = 50 (Units = 0.02 Seconds)
S14	Status, Bitmapped	DFV	-	See Appendix B
S16	Status, Bitmapped	DFV	-	See Appendix B
S18	Test Timer	DFV	0 - 255	Default = 0 (Units = Seconds)
S21	Status, Bitmapped	DFV	-	See Appendix B
S22	Status, Bitmapped	DFV	-	See Appendix B
S23	Status, Bitmapped	DFV	-	See Appendix B
S34	V.34 Control	DFV	0 - 255	bit 0: 0 = expanded constellation bit 0: 1 = minimum constellation bit 1: 0 = nonlinear encoder disabled bit 1: 1 = nonlinear encoder enabled bit 2: 0 = precoding disabled bit 2: 1 = precoding enabled Default = 6
S46	Enable &F=n	DFV	0 - 255	Default = 2 (Bit-mapped)
S54	Status, Bitmapped	DFV	-	See Appendix B
S56	Status, Bitmapped	DFV	-	See Appendix B
S58	Status, Bitmapped	DFV	-	See Appendix B
S59	Status, Bitmapped	DFV	-	See Appendix B
S62	Status, Bitmapped	DFV	-	See Appendix B
S67	Status, Bitmapped	DFV	-	See Appendix B
S69	Status, Bitmapped	DFV	-	See Appendix B
S70	Status, Bitmapped	DFV	-	See Appendix B
S71	Status, Bitmapped	DFV	-	See Appendix B
S75	V.PCM equalizer range	DFV	0	160 taps
			1	180 taps
			2	200 taps
			3	220 taps
			4	240 taps
			5	260 taps
			6	280 taps
			7	300 taps
			8	320 taps
			9	340 taps
			10	360 taps

AT Cmd	Function	Mode	Value	Setting
			11	380 taps
			12	400 taps
S76	V.PCM RSSE states	DFV	0	2 states
			1	4 states
S77	V.PCM control	DFV	0 - 255	bit 0: 0 = infidelity training off bit 0: 1 = infidelity training on bit 1: 0 = timing without limiter bit 1: 1 = timing with limiter bit 2: 0 = mu-law companding bit 2: 1 = A-law companding Default = 2
S80	Status, Bitmapped	DFV	-	See Appendix B
S81	Status, Bitmapped	DFV	-	See Appendix B
S88	Status, Bitmapped	DFV	-	See Appendix B
S91	Status, Bitmapped	DFV	-	See Appendix B

Table A: Country Codes for AT&F=N

N	*Country*	*N*	*Country*	*N*	*Country*	*N*	*Country*	*N*	*Country*
1	USA	9	Czech Repub	15	Hong Kong	23	Malaysia	34	Sweden
3	Australia	10	Denmark/TBR	18	Ireland	25	Netherlands	35	Switzerland
4	Austria	11	Finland	19	Israel	27	Norway	38	UK
5	Belgium	12	France	20	Italy	30	Portugal	40	S. Africa
6	Brazil/UI	13	Germany	21	Japan	33	Spain	41	Turkey
7	Canada								

Table B: EIA Status (AT*CT)

Bit #	Definition
0	RTS
1	CTS
2	DSR
3	DCD
4	SQA (N/A)
5	DTR
6	RI
7	TIA (N/A)

On=1, Off =0

Table C: Disconnect Codes

Code	*Reason*	*Code*	*Reason*
0	None	40	EC - Remote Requested
1	DTR Drop	41	EC - No Valid Packet Received
2	ATH Received	42	EC - Establishment Error
3	Remote Disconnect	43	EC - Acceptor Time Out
4	Manager Request	44	EC - Negotiation Failure
5	Major Strap Change	45	EC - Protocol Violation
6	Restoral - Manager	46	EC - Bad Parameter
7	End Restoral - manager	47	EC - Data Compression Failure
8	Mimic	48	FSK Reliable Invalid
9	Talk/Data	49	Restoral - DTR
10	End Restoral - DTR	50	Restoral - 116
11	End Restoral - 116	51	Restoral - Auto
12	Off-line Test	52	Restoral - Answer
13	Training Failure	53	Restoral - Talk/Data
14	Security Failure - Invalid PW	54	End Restoral - Talk/Data
15	Security Callback	55	End Restoral - DTOL Time-out
16	End Restoral - Auto	56	Lease Line Test
17	EC Local Request	57	Lease Line Test - Manager
18	Already Connected	58	Lease Line Test Failed
19	Dial Aborted	59	External Option Set Selected
20	Busy Tone Detected	60	Option Set Selected - ATZ
21	No Dialtone	61	Lease Line Test Passed
22	Long Space Detected	62	Security Failure - No Callback Number
23	Dial Aborted - Incoming Call	63	Security Failure - Manager Time Out
24	Improper DTR State	64	Security Failure - Callback Invalid
25	Phone Number Blacklisted	65	Security Failure - Interdigit Time Out
26	Retrain Threshold	66	DTE Inactivity Time-out
27	Ans-Orig Pin Change	67	Restoral - ACU
28	No Stored Number To Dial	68	End Restoral - ACU
29	In Test Mode	69	Restoral - DTR ACU
30	Callback In Progress	70	End Restoral - DTR ACU
31	FSK Sync Invalid	71	Restoral - 116 ACU
32	Semicolon Detected	72	End Restoral - 116 ACU
33	ABT Time-out - No Ring Back	73	LPDA2 Disconnect
34	ABT Time-out - Ring Back Received	74	EC Remote No PSTN
35	ABT Time-out - No Call Progress	75	Strap Change
36	ABT Time-out - No Answer	76	Retrain Time-out
37	Busy After Ring Back	77	Remote Access Reset
38	Denied Manager Down	78	Voice Disconnect - VLS=0
39	EC - Retransmission Limit	79	Voice to Fax/Data Switch
		80	Unknown

Table D: Bit Positions of Supported Events

Bit	*Event*
0	Caller ID
2	Distinctive Ring
3	RING
4	DTMF Detection
5	Receive Buffer Overrun
6	Fax Calling (1100 Hz.)
7	Data Calling (1300 Hz.)
9	Presumed Hang-Up (SILENCE) Time-out
10	Presumed End-of-Message (QUIET) Time-out
18	RINGBACK
19	BUSY
20	DIALTONE
23	Playback Buffer Underrun
25	Fax or Data Answering Modem detected
27	Voice Detected

Table E: Parameter Types for AT+VTS

Type	*Meaning*
D	D = DTMF tone for default duration
{D,d}	D=DTMF tone, d=duration
[F1,F2,d]	F1=Frequency 1, F2=Frequency 2, d=duration

Note: Any number of parameters can occur on a single line, separated by commas.
If no DTMF tone or Frequency is given, then silence is generated for the given duration.

Appendix B - Status S-Registers

S14

Bit	Value	Command	Description
1	0	E	Local character echo off
	1	E1	Local character echo on
2	0	Q	Response messages on
	1	Q1	Response messages off
3	0	V	Response messages as digit codes
	1	V1	Response messages as words
7,6	00	&P	Make/Break ratio 40/60
	10	&P1	Make/Break ratio 33.5/66.5
	01	&P2	Make/Break ratio 38.5/61.5

S16

Bit	Value	Command	Description
0	0		Analog loopback inactive
	1		Analog loopback in progress

S21 - EIA Signals

Bit	Value	Command	Description
2	0	&R	CTS follows RTS (Normal)
	1	&R1	CTS always on (High)
4,3	00	&D	Ignore DTR
	01	&D1	On-to-off, enter command mode
	10	&D2	On-to-off, disconnect call
	11	&D3	On-to-off, reset to default configuration
5	0	&C	DCD always on (High)
	1	&C1	DCD in data mode only
6	0	&S	DSR always on (High)
	1	&S1	DSR on while On-Line

S22

Bit	Value	Command	Description
1,0	00	L	Speaker volume low
	01	L1	Speaker volume low
	10	L2	Speaker volume medium
	11	L3	Speaker volume high
3,2	00	M	Speaker off
	01	M1	Speaker on until carrier detect
	10	M2	Speaker on until carrier detect
	11	M3	Speaker off when modem is dialing
6-4	000	X	CONNECT message only, blind dials, no busy detect
	001	X1	CONNECT/rate code, blind dials, no busy detect
	010	X2	CONNECT/rate code, waits for dial tone, no busy detect
	011	X3	CONNECT/rate code, blind dials, reports BUSY
	100	X4	CONNECT/rate code, waits for dial tone, reports BUSY

S23 - Guard Tone

Bit	Value	Command	Description
7,6	00	&G	Guard tone off
	01	&G1	Guard tone 550Hz
	10	&G2	Guard tone 1800Hz

S54 - Flow Control

Bit	Value	Command	Description
1,0	00	\Q	DTE flow control disabled
	01	\Q1	DTE flow control enabled, XON/XOFF
	11	\Q3	DTE flow control enabled, RS/CTS
3	0	\G	DCE flow control disabled
	1	\G1	DCE flow control enabled

S56 - Compression Control

Bit	Value	Command	Description
1,0	00	%C	Data compression disabled
	11	%C1	Data compression enabled

S58 - Inactivity Timer

Bit	Value	Command	Description
7-0	0	\T	Disabled
	1-255	\T(n=1-255)	Timer value in Minutes

S59 - Break Control

Bit	Value	Command	Description
2-0	001	\K1	Destructive and expedited
	011	\K3	Non-destructive and expedited
	101	\K5	Non-destructive and non-expedited

S62 - Disconnect Buffer Delay

Bit	Value	Command	Description
7-0	0	%D	Buffer disabled
	1-255	%D(n=1-255)	Disconnect buffer delay value (seconds)

S67 - Link Speed Status

Bit	Value	Command	Description
5-0	000001		300 bps
	000010		600 bps
	000011		1200 bps
	000100		2400 bps
	000111		4800 bps
	000101		7200 bps
	000110		9600 bps uncoded
	001000		9600 bps trellis
	001001		12000 bps
	001010		14400 bps
	001011		16800 bps
	001100		19200 bps
	001101		21600 bps
	001110		24000 bps
	001111		26400 bps
	010000		28800 bps
	010001		31200 bps
	010010		33600 bps
	010011		32000 bps
	010100		34000 bps
	010101		36000 bps
	010110		38000 bps
	010111		40000 bps
	011000		42000 bps
	011001		44000 bps
	011010		46000 bps
	011011		48000 bps
	011100		50000 bps
	011101		52000 bps
	011110		54000 bps
	011111		56000 bps
	100000		58000 bps
	100001		60000 bps

S69 - DCE Speed

Bit	Value	Command	Description
5-0	00001	%B1	300 bps
	00011	%B2	1200 bps
	00100	%B3	2400 bps
	00111	%B4	4800 bps
	00010	%B5	600 bps
	00110	%B6	9600 bps
	01000	%B7	7200 bps
	01001	%B8	12000 bps
	01010	%B9	14400 bps
	01011	%B11	16800 bps
	01100	%B12	19200 bps
	01101	%B13	21600 bps
	01110	%B14	24000 bps
	01111	%B15	26400 bps
	10000	%B16	28800 bps
	10001	%B17	31200 bps
	10010	%B18	33600 bps
	010011	%B19	32000 bps
	010100	%B20	34000 bps
	010101	%B21	36000 bps
	010110	%B22	38000 bps
	010111	%B23	40000 bps
	011000	%B24	42000 bps
	011001	%B25	44000 bps
	011010	%B26	46000 bps
	011011	%B27	48000 bps
	011100	%B28	50000 bps
	011101	%B29	52000 bps
	011110	%B30	54000 bps
	011111	%B31	56000 bps
	100000	%B32	58000 bps
	100001	%B33	60000 bps

S70 - Operating Mode

Bit	Value	Command	Description
2-0	000	\N	Normal
	001	\N1	Direct
	100	\N4	LAPM Only (Reliable)
	110	\N6	Reliable
	111	\N7	Auto Reliable

S71 - Operating Mode Status

Bit	Value	Command	Description
3-0	0000		Protocol not active
	0001		Protocol negotiation in progress
	0010		MNP level 2 active
	0011		MNP level 3 active
	0100		MNP level 4 active
	0101		MNP level 5 active - MNP with data compression
	0110		LAPM active
	0111		LAPM with data compression active
	1000		MNP level 1 active

S80 - Serial Port Speed

Bit	Value	Command	Description
4-0	00001		300 bps
	00010		600 bps
	00011		1200 bps
	00100		2400 bps
	00101		4800 bps
	00110		7200 bps
	00111		9600 bps
	01000		12000 bps
	01001		14400 bps
	01010		16800 bps
	01011		19200 bps
	01100		21600 bps
	01101		24000 bps
	01110		26400 bps
	01111		28800 bps
	10000		38400 bps
	10001		57600 bps
	10010		115200 bps

S81 - Minimum DCE Speed

Bit	Value	Command	Description
5-0	00001	%L1	300 bps
	00011	%L2	1200 bps
	00100	%L3	2400 bps
	00111	%L4	4800 bps
	00010	%L5	600 bps
	00110	%L6	9600 bps
	01000	%L7	7200 bps
	01001	%L8	12000 bps
	01010	%L9	14400 bps
	01011	%L11	16800 bps
	01100	%L12	19200 bps
	01101	%L13	21600 bps
	01110	%L14	24000 bps
	01111	%L15	26400 bps
	10000	%L16	28800 bps
	10001	%L17	31200 bps
	10010	%L18	33600 bps
	010011	%L19	32000 bps
	010100	%L20	34000 bps
	010101	%L21	36000 bps
	010110	%L22	38000 bps
	010111	%L23	40000 bps
	011000	%L24	42000 bps
	011001	%L25	44000 bps
	011010	%L26	46000 bps
	011011	%L27	48000 bps
	011100	%L28	50000 bps
	011101	%L29	52000 bps
	011110	%L30	54000 bps
	011111	%L31	56000 bps
	100000	%L32	58000 bps
	100001	%L33	60000 bps

S88 - Modulation Type

Bit	Value	Command	Description
4-0	00000	*MM0	V.34 Automode
	00001	*MM1	V.21
	00010	*MM2	B103
	00101	*MM5	V.22 bis
	01011	*MM11	V.32 bis
	01100	*MM12	V.34
	10000	*MM10	V.32
	10001	*MM6	V.23
	10010	*MM4	B212
	10100	*MM13	V.PCM
	10101	*MM14	V.PCM Auto

S91 - Current Modulation

Bit	Value	Command	Description
4-0	00000		V.34 Automode
	00001		V.21
	00010		B103
	00101		V.22 bis
	00110		V.27 ter
	01000		V.29
	01011		V.32 bis
	01100		V.34
	10000		V.32
	10001		V.23
	10010		B212
	10011		V.17
	10100		V.PCM
	10101		V.PCM Auto

Appendix C - Connect Message Codes

Connect Message Codes for Numeric Format

Verbose	Numeric
" "	"1"
"300"	"20"
“600”	“13”
"1200"	"5"
"2400"	"10"
"4800"	"11"
"7200"	"22"
"9600"	"12"
"12000"	"23"
"14400"	"24"
"16800"	"25"
"19200"	"26"
"21600"	"27"
"24000"	"28"
"26400"	"29"
"28800"	"30"
"31200"	"31"
“32000”	“37”
"33600"	"32"
“34000”	“38”
“36000”	“39”
“38000”	“40”
"38400"	"34"
"40000"	"41"
"42000"	"42"
"44000"	"44"
"46000"	"46"
"48000"	"48"
"50000"	"50"
"52000"	"52"
"54000"	"54"
"56000"	"56"
"57600"	"35"
“58000”	“58”
“60000”	“60”
"115200"	"36"

Note: First row of this table represents the code displayed when call progress is set to 0. When call progress is 0, no rate is displayed in the connect message, only the word "CONNECT", which is represented by the numeric code "1". For all other call progress settings, the rate information is displayed and reflected in the numeric code displayed.

Appendix D - Connect Message Examples

The following table shows a few examples of how the long-form connect message will look, based upon the settings of the /V (connect message) and X (call progress) strap settings.

Example Long-Form Connect Messages

		38400 DTE, 28800 DCE Reliable	19200 DTE, 9600 DCE Normal
/V0	X0	CONNECT	CONNECT
/V0	X1	CONNECT 19200	CONNECT 19200
/V1	X0	CONNECT	CONNECT
/V1	X1	CONNECT 19200/V42/V42BIS	CONNECT 19200
/V2	X0	CONNECT	CONNECT
/V2	X1	CONNECT 28800	CONNECT 9600
/V3	X0	CONNECT	CONNECT
/V3	X1	CONNECT 28800/V42/V42BIS	CONNECT 9600
/V4	X0	CONNECT	CONNECT
/V4	X1	CONNECT 28800/V34/V42/V42BIS	CONNECT 9600/V32

Note: Call Progress settings of 2,3, and 4 will display the same connect message format as the setting of 1.

Appendix E - Homologation Testing Command

Homologation Automated Test Options

This command is a special test hook that causes the modem to go off-hook and generate a continuous signal. In order to enable this command you must first type the command ATS46=0. The signal that is specified by the AT*HO options is sent over the modem line interface as long as AT*HO is set to a non-0 option. This capability is necessary for measuring the inband and outband noise condition for each signal.

Spectrums

Spectrums are affected by the transmit level and other options.

DTMF

When DTMF is selected, the modem goes off-hook and generates the digit specified as option 2. This is a continuous DTMF signal (no off time). It is necessary to characterize the inband and outband noise.

The AT*HO command takes between 1 and 4 option parameters.
This command has the format:

AT*HOa,b,c,d

where:

a = a parameter 1 option
b = a parameter 2 option
c = a parameter 3 option
d = a parameter 4 option

Examples:

AT*HO1,15,0,1 represents V.21, -15dB, Answer Band, Space
AT*HO12,4 represents DTMF, digit 4

Parameter 1		***Parameter 2 (Tx Level)***		***Parameter 3***		***Parameter 4***	
Option	*Description*	*Option*	*Description*	*Option*	*Description*	*Option*	*Description*
0	Normal						
1	V.21	9 to 20	-9 to -20 dB	0 1	Answer Band Originate Band	0 1	Mark Space
2	Bell 103	9 to 20	-9 to -20 dB	0 1	Answer Band Originate Band	0 1	Mark Space
3	V.23	9 to 20	-9 to -20dB	0 1 2	Forward (1200) Forward (600) Backward (75)	0 1 2	Binary 1 Binary 0 Pattern

Parameter 1		***Parameter 2 (Tx Level)***		***Parameter 3***		***Parameter 4***	
Option	*Description*	*Option*	*Description*	*Option*	*Description*	*Option*	*Description*
5	V.22	9 to 20	-9 to -20 dB	0 1 2 3	Orig. Band -1200 bps Ans. Band - 1200 bps Orig. Band - 2400 bps Ans. Band - 2400 bps	0 1 2	No Guard Tone 550 Guard Tone 1800 Guard Tone
6	V.27	9 to 20	-9 to -20 dB	0 1	2400 bps 4800 bps		
7	V.29	9 to 20	-9 to -20 dB	0 1	7200 bps 9600 bps		
8	V.17	9 to 20	-9 to -20 dB	0 1 2 3	7200 bps 9600 bps 12000 bps 14400 bps		
10	V.32bis	9 to 20	-9 to -20 dB	0 1 2 3 4	4800 bps 7200 bps 9600 bps 12000 bps 14400 bps		
11	V.34	9 to 20	-9 to -20 dB	0 1 2 3 4 5 6 7 8 9 10 11 12 13	2400 bps 4800 bps 7200 bps 9600 bps 12000 bps 14400 bps 16800 bps 19200 bps 21600 bps 24000 bps 26400 bps 28800 bps 31200 bps 33600 bps	0 3 4 5 10 13 14 15	2400 baud - high channel 3000 baud - high channel 3200 baud - high channel 3429 baud - high channel 2400 baud - low channel 3000 baud - low channel 3200 baud - low channel 3429 baud - low channel
12	DTMF	0 to 9 A to D # *					
13	Calling Tone	9 to 20	-9 to -20 dB	0 1	1100 1300		
14	Answer Back Tone						
15	Quiet Mode						

"This equipment has been approved to [Council Decision 98/482/EC - "CTR 21"] for pan-European single terminal connection to the Public Switched telephone Network (PSTN). However, due to differences between the individual PSTNs provided in different countries, the approval does not, of itself, give an unconditional assurance of successful operation on every PSTN termination point.

In the event of problems, you sholud contact your equipment supplier in the first instance"